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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/666,775 | 09/18/2003 | Julie C. Biggs | END920030018US1 (IEN-10-5) | 9436 |
| 26681 | 7590 | 06/14/2005 | EXAMINER PHAM, THANHHA S | |
| DRIGGS, LUCAS, BRUBAKER & HOGG CO. L.P.A. 38500 CHARDON ROAD DEPT. IEN WILLOUGHBY HILLS, OH 44094 | | | ART UNIT 2813 | PAPER NUMBER |

DATE MAILED: 06/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/666,775

Applicant(s)

BIGGS ET AL.

Examiner

Thanhha Pham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 and 15-19 is/are pending in the application.
- 4a) Of the above claim(s) 1-10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-13 and 15-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to Applicant's Amendment dated 03/15/2005.

Election/Restrictions

1. This application contains claims 1-10 drawn to an invention nonelected with traverse in Paper No. 03/16/2005. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

3. **Claims 15 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.** Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. In this situation, claim 15 depends on claim 14 while claim 14 was cancelled.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 11 and 15 are rejected under 35 U.S.C. 102(e) as anticipated by Wanatabe [US 6,614,113].

► With respect to claim 11, Wanatabe (figure 10 and cols. 1-7) discloses an I/C chip suitable for wire bonding (as to the preamble, Wanatabe structure of IC chip is suitable for wire bonding) comprising:

at least one conductive bond pad (5, col. 4 lines 27-35)

at least one layer of dielectric material (6, col. 5 lines 55-62) overlying said conductive bond;

a surface defining an opening in said layer of dielectric material (6) exposing said conductive bond pad (5);

a conductive seed layer (32, col. 6 lines 1-7) disposed in said opening overlying said conductive bond pad and in contact therewith and in contact with the entire surface of said opening (the seed conductive layer 32 is indirectly contact with the opening through conductive material 31) and having at least one exposed edge;

at least one layer of conductive material (33B) overlying said conductive seed layer and completely covering said conductive seed including all exposed edges.

► With respect to claim 15, Wanatabe et al (fig. 9) shows an intermediate conductive layer (31) is provided between said conductive seed layer (32) and said bond pad (5).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 12-13 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wanatabe et al. [US 6,614,113] in view of Mis et al. [US 6,762,122].

► With respect to claims 12-13, Wanatabe et al. substantially discloses the claimed IC chip including at least one layer of the conductive material overlying the conductive seed layer and completely covering said conductive seed layer including all exposed edges. Wanatabe et al (fig. 10) does not expressly disclose there are two layers of conductive material plated on the seed layer in the opening *[claim 12]* wherein said two layers of conductive material are Ni and Au *[claim 13]*. Instead, Wanatabe et al shows a layer of conductive material (33B) plated on the seed layer (32) as a top portion of underbump metallurgy.

However, using two layers of conductive materials of Ni and Au as top portion for underbump metallurgy has been known in the art. See Mis et al as an evidence that shows using Ni and Au as two layers (31a/33a or 31b/33b, fig 1C, col. 4 lines 38-51) as top portion for underbump metallurgy to receive either wire bonding or solder bump.

Therefore, at the time of invention, it would have been obvious for those skilled in the art to modify IC chip of Wanatabe et al. by using the two layers of conductive material of Ni and Au as being claimed, per taught by Mis et al, as known material for the top portion of underbump metallurgy to prevent problem of diffusion and oxidation of said IC chip for wire bonding or solder bump technique.

► With respect to claim 18, Wanatabe et al. substantially discloses the claimed IC chip including wherein said at least one layer of conductive material defines a wall in said IC chip. Wanatabe et al does not expressly teach a ball bond and wire is disposed in said IC chip. Instead, Wanatabe et al disposes a solder bump in said IC chip.

However, using the ball bond and wire to provide electrical connection for IC chip has been known in the art. In addition, Mis et al shows using the solder bump or the ball bond and wire to provide electrical connection for IC chip.

Therefore, at the time of invention, it would have been obvious for those skilled in the art, in view of Mis et al, to use the ball bond and wire as being claimed for the IC chip of Wanatabe et al as conventional means to provide electrical connection for the IC chip – Since according to Mis et al, using either of the solder bump or the ball bond wire has been known and obvious for those skilled in the art.

6. Claims 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wanatabe et al [US 6,614,113] in view of McCormick [US 6,706,622].

Wanatabe et al substantially discloses the IC chip including the intermediate conductive layer provided between the conductive seed layer and the conductive bond pad. The intermediate conductive layer of Wanatabe et al provides an bottom portion of the underbump metallurgy. Wanatabe et al does not expressly teach the intermediate conductive layer is TaN/Ta.

However, McCormick teaches using the intermediate conductive layer (16) of TaN/Ta underlying the conductive seed layer (18), as the bottom portion of underbump metallurgy, to provide a barrier layer of said underbump metallurgy.

Therefore, at the time of invention, it would have been obvious for those skilled in the art to modify the IC chip of Wanatabe et al by using the intermediate conductive layer TaN/Ta as being claimed, per taught by McCormick, to provide the barrier layer of the underbump metallurgy to prevent undesirable interaction between the underbump metallurgy and the bond pad.

7. Claims 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wanatabe et al [US 6,614,113] in view of Chen et al. [US 6,649,507].

Wanatabe et al substantially discloses the claimed IC chip including the at least one conductive bond pad. Wanatabe et al is silent about the conductive bond pad in the IC chip is Al.

However, Al is a known material for wire bonding to provide electrical connection for IC chip. Selection of a known material based on its suitability for its intended use

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supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) "Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig-saw puzzle." 325 U.S. at 335, 65 USPQ at 301. See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960) (selection of a known plastic to make a container of a type made of plastics prior to the invention was held to be obvious). See *Chen et al* as an evidence that shows a usage of Al for the conductive bond pad.

Therefore, at the time of invention, it would have been obvious for those skilled in the art, in view of *Chen et al.*, to select Al as the known material for the conductive bond pad as being claimed, in the IC chip of *Wanatabe*, to provide cites/terminals for electrical connection of the IC chip.

8. Claims 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Wanatabe et al* [US 6,614,113] in view of *Mis et al.* [US 6,762,122] as applied to claim 18 above, in further view of *Moyer et al.* [US 6,620,720].

Wanatabe et al in view of *Mis et al* substantially discloses the claimed IC chip but is silent about using the ball bond and wire of Au.

However, Au is a known material for wire bonding to provide electrical connection for IC chip. Selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) "Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the

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last piece to put in the last opening in a jig-saw puzzle." 325 U.S. at 335, 65 USPQ at 301. See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960) (selection of a known plastic to make a container of a type made of plastics prior to the invention was held to be obvious). See *Moyer et al.* (fig 6A, cols 3-4) as an evidence that shows a usage of Au for wire bonding.

Therefore, at the time of invention, it would have been obvious for those skilled in the art, in view of *Moyer et al.*, to select Au as the known material for the ball bond and wire as being claimed in the IC chip of *Wanatabe* in view of *Mis et al* to provide appropriate electrical connection to operate the device.

Response to Arguments

9. Applicant's arguments with respect to claims 11-13 and 15-19 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. . Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanhha Pham whose telephone number is (571) 272-1696. The examiner can normally be reached on Monday and Thursday 9:00AM - 9:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thanhha Pham


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